

Abstract for 23rd Arctic and Marine Oilspill Program, June 2000

Title: Survey of technologies available to detect small leaks on the Trans Alaska Pipeline

Estimated length of written paper: 7 pages

We prefer a 20-minute oral presentation

We plan to use transparencies for an overhead projector

Topic area: 6. Detection, Tracking and Remote Sensing.

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The Alyeska Pipeline Service Company (Alyeska) operates the 800-mile-long Trans Alaska Pipeline System (TAPS). Alyeska engaged Caltech's Jet Propulsion Laboratory (JPL), NASA's center for exploration of the solar system beyond earth orbit, to see whether it would be practical to use sensor technologies developed for space exploration to detect any small leaks which might occur on the pipeline. Migration of technology to practical application in an industrial setting is important for TAPS.

JPL examined the following major technology areas: remote chemical and thermal sensors, both active and passive; in-situ chemical sensing; ground penetrating radar; airborne lidar; and others. It became clear that space-based remote sensing would not provide adequate resolution to detect leaks of the small size desired. As seen from space, the variability of the atmospheric column above and terrain around the pipeline make for a difficult calibration problem when attempting to detect small changes (i.e. small leaks.) Similar issues also arose for aircraft-based sensors including ground penetrating radar.

Thus the conclusion was that a simple in-situ system consisting of mass-produceable single-chip or very small sensors capable of one-time or multi-use detection of hydrocarbons would be the best option for a retrofitted system for TAPS. Options for these sensors, their relationship to organics sensors being developed for the cold, dry environment of Mars, and the communications challenges inherent in the network will be discussed.